



The U.S. Environmental Protection Agency's **ENERGY STAR® Homes Program** promotes the use of high-efficiency technologies and equipment. ENERGY STAR Homes use at least 30% less energy than homes built to meet the national Model Energy Code while maintaining or improving indoor air quality. These fact sheets are designed to help consumers learn more about the energy-efficient improvements to their ENERGY STAR Homes.

DUCT SEALING

AIR DISTRIBUTION SYSTEM IMPROVEMENTS

Air distribution system ducts are designed to supply conditioned air from space heating and cooling equipment to the living spaces and return an equal volume of air from the living spaces back to the heating and cooling equipment to be conditioned. However, residential ducts typically leak 15 percent to 20 percent of the air they convey.

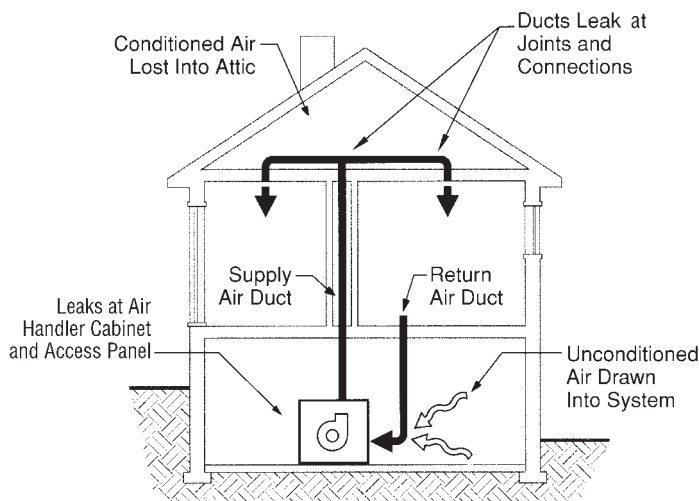
Ducts are usually located in unconditioned spaces such as attics, crawlspaces, garages, or unfinished basements. The conditioned air that leaks out of the supply ducts is lost in the spaces where the ducts are located. Typically, heating and cooling equipment is designed to condition return air that is at or near room temperature. Leaky return ducts can draw air out of unconditioned spaces that is hotter or colder than the return air, thus increasing loads on heating and cooling systems. This problem is most pronounced in attics where, during the summer months, air temperatures can be 150°F or higher. Even when furnaces or air conditioners are not operating, leaky ducts waste energy by contributing to the overall air leakage of a house. In new, tightly constructed houses, ducts can account for 20 percent to 25 percent of the total air leakage. Leaky

ducts located in unconditioned spaces can introduce airborne pollutants, moisture, and unpleasant odors into homes, thus reducing indoor air quality.

Duct leakage is the result of improper installation and poor materials. Duct tape, which is commonly used, does not adequately seal joints between ducts and has a short life. More stable and permanent materials are needed such as foil tape, fiberglass tape and mastic, or new advanced duct tape. Locating the ducts within the conditioned space can also improve system efficiency. Even when ducts are located within conditioned spaces, sealing is still required to assure proper air distribution.

The ENERGY STAR Homes Program promotes the proper sealing of air distribution ducts as a means of reducing energy consumption and improving indoor air quality. If properly sealed, the duct system in a house can significantly improve heating and cooling equipment efficiency and performance.

FIGURE 1: TYPICAL LOCATIONS OF DUCT LEAKS



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RESOURCES

The following fact sheets are available by calling the U.S. Environmental Protection Agency's toll-free ENERGY STAR Hotline at 1-888-STAR-YES (1-888-782-7937): ***Right-Sized/Compact Ducts*** and ***Duct Insulation***.

Bigger Is Not Better consumer brochure available from the Environmental Protection Agency's ENERGY STAR Hotline at 1-888-STAR-YES (1-888-782-7937).

BENEFITS

Duct sealing can provide many benefits including:

Improved comfort. Duct sealing increases the amount of conditioned air that is distributed to the living spaces within a residence. The heating and cooling systems can operate more efficiently resulting in quicker recovery from night-time setbacks and a more consistent level of comfort throughout a house.

Improved indoor air quality. Leaky return ducts located in attics, unfinished basements, crawlspaces, and garages can draw pollutants such as dirt, dust, mold, fumes from solvents, radon gas, and carbon monoxide exhaust from cars into homes. Proper sealing of the return ducts can reduce the amount of airborne pollutants that enter homes and therefore improve indoor air quality.

Better humidity control. Air conditioning systems cool and dehumidify indoor air by recirculating it over an evaporator coil. Leaky return ducts can draw hot and humid air out of attics and crawlspaces and overwhelm the capacity of the air conditioner coil to cool and dehumidify the indoor air. Air that is not properly dehumidified can be uncomfortable and promote the growth of mold and mildew indoors.

Lower utility bills. The average homeowner spends

more than \$600 per year on space heating and cooling. Duct sealing can reduce this cost by between \$60 and \$120 per year, making a home less expensive to operate.

Lower equipment cost. Duct sealing, in conjunction with a compact air distribution system layout and good insulation techniques, can reduce space conditioning loads which can allow the installation of a smaller, less costly heating and cooling equipment.